WHAT IS CLAIMED IS:

1. A single electron transistor device comprising:

a source;

a drain;

a gate having a gate area; and

silicon nanoparticles implanted in said gate area.

2. The single electron device according to claim 1, further comprising a buried gate contact to electrically stimulate said silicon nanoparticles separately from a contact to said gate.

3. The single electron device according to claim 1, wherein said silicon nanoparticles have a diameter of approximately 1 nm.

4. The single electron device according to claim 1, wherein said silicon nanoparticles exhibit an energy spacing of approximately 1 eV.

5. A method for operating a single electron device, which has a source, a drain, a gate having a gate area, and at least silicon nanoparticles implanted in the gate area, comprising the steps of:

creating at least one electron hole in the silicon nanoparticles to enable the silicon nanoparticles to conduct a single electron at room temperature across the source and the drain; and

applying a voltage across the drain and the source.

6. The method of operating the single electron device according to claim 4, wherein said step of creating an electron hole in said silicon nanoparticles is accomplished by irradiating said silicon nanoparticles.

7. The method of operating the single electron device according to claim 5, wherein said step of creating an electron hole uses light having a spectral width between 300nm and 600nm.

8. A transistor memory device comprising:

a source;

a drain; and

a gate, said gate having a gate area with silicon nanoparticles contained in a control oxide and separate from a tunnel oxide disposed between said source and drain.